

AMENDMENTS TO THE CLAIMS:

1. (Currently Amended) An apparatus for supporting a manufacturing tool relative to a workpiece, the apparatus comprising:

a track assembly adapted to be attached to the workpiece and including at least one rail, the rail having a longitudinally-extending neutral axis and a rack extending along a pitch line that at least approximately coincides with the longitudinally-extending neutral axis, wherein the rack comprises ~~one or more~~ a plurality of tapered apertures; and

a carriage comprising an x-axis portion moveably coupled to the track assembly and moveable relative to the workpiece along the rail, and a y-axis portion slideably coupled to the x-axis portion and moveable with respect to the x-axis portion along a y-axis oriented transversely to the track assembly.

2. (Original) The apparatus of Claim 1, wherein the rack is integrally-formed in the rail.

3. (Canceled).

4. (Currently Amended) The apparatus of Claim 1, wherein the ~~one or more~~ tapered apertures include a plurality of ~~one or more~~ wedge shaped apertures.

5. (Currently Amended) The apparatus of Claim 1, wherein the ~~one or more~~ tapered apertures include a plurality of ~~one or more~~ conically-shaped apertures.

6. (Original) The apparatus of Claim 1, wherein the rail comprises a substantially flat member having a width substantially greater than a thickness of the substantially flat member, the substantially flat member being substantially stiffer in bending about a stiff axis that extends in a first direction aligned along the thickness of the substantially flat member, and being

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substantially more flexible in bending about a bending axis that extends in a second direction aligned along the width of the substantially flat member.

7. (Original) The apparatus of Claim 1, wherein the at least one rail comprises a first rail and a second rail oriented approximate parallel to the first rail, the first and second rails each having a longitudinally-extending neutral axis and a rack, the rack extending along a pitch line that at least approximately coincides with the longitudinally-extending neutral axis.

8. (Original) The apparatus of Claim 1, wherein the track assembly includes:

first and second elongate flexible rails, the rails being spaced apart and approximately parallel to each other; and

a plurality of vacuum attachment devices connected to each rail and spaced at intervals therealong for releasably attaching each rail to the surface of the workpiece by vacuum, with the widths of the rails extending substantially parallel to the surface of the workpiece, the rails bending and twisting as needed to substantially follow the surface of the workpiece.

9. (Original) The apparatus of Claim 8, wherein each rail is relatively stiff in bending about a first bending axis and relatively flexible in bending about a second bending axis orthogonal to the first bending axis, and wherein each rail is mounted on the workpiece such that the first bending axis is substantially normal to the workpiece surface and the second bending axis is substantially parallel to the workpiece surface.

10. (Currently Amended) The apparatus of Claim 1, ~~further comprising a carriage moveably coupled to the track assembly and moveable relative to the workpiece along the at least one rail,~~ wherein the carriage ~~including~~ includes a tool support adapted to receive and support a manufacturing tool.

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11. (Original) The apparatus of Claim 10, wherein the carriage includes a drive assembly adapted to drive the carriage along the track assembly and having a drive motor coupled to a drive gear, the drive gear operatively engaging the rack.

12. (Currently Amended) The apparatus of Claim 10, wherein ~~the rack includes a plurality of apertures and wherein~~ the carriage includes a drive assembly adapted to drive the carriage along the track assembly and having a drive motor coupled to a drive gear, the drive gear having a plurality of teeth, at least some of the teeth operatively engaging the apertures of the rack, the apertures being adapted to match a cross-sectional profile of the teeth.

13. (Original) The apparatus of Claim 10, further comprising an opposing-force support assembly operatively coupled to the carriage and adapted to be secured to the workpiece to at least partially counterbalance a manufacturing force exerted on the workpiece by the manufacturing tool.

14. (Canceled).

15. (Currently Amended) An assembly for performing a manufacturing operation on a workpiece, the assembly comprising:

a track assembly adapted to be attached to the workpiece and including a plurality of at least one rails, the rails being spaced apart and oriented approximately parallel, the each rail having a longitudinally-extending neutral axis, and at least one rail having a rack extending along a pitch line that at least approximately coincides with the longitudinally-extending neutral axis, wherein the rack comprises a plurality of one or more tapered apertures;

a carriage comprising an x-axis portion moveably coupled to the track assembly and moveable relative to the workpiece along the rails track-assembly, and a y-axis portion slideably coupled to the x-axis portion and moveable with respect to the x-axis portion along a y-axis oriented transversely to the track assembly, the carriage including a tool support adapted to receive and support a manufacturing tool; and

a manufacturing tool coupled to the tool support and adapted to be engageable with the workpiece to perform the manufacturing operation on the workpiece.

16. (Currently Amended) The assembly of Claim 15, wherein the at least one rack is integrally-formed in the at least one the rail.

17. (Canceled).

18. (Currently Amended) The assembly of Claim 15, wherein the ~~one or more~~ tapered apertures includes a plurality of one or more wedge-shaped apertures.

19. (Currently Amended) The assembly of Claim 15, wherein the ~~one or more~~ tapered apertures includes a plurality of one or more conically-shaped apertures.

20. (Currently Amended) The assembly of Claim 15, wherein each of the rails comprises a substantially flat member having a width substantially greater than a thickness of the substantially flat member, the substantially flat member being substantially stiffer in bending about a stiff axis that extends in a first direction aligned along the thickness of the substantially flat member, and being substantially more flexible in bending about a bending axis that extends in a second direction aligned along the width of the substantially flat member.

21. (Currently Amended) The assembly of Claim 15, wherein the plurality of at least one rails comprises a first rail and a second rail ~~oriented approximately parallel to the first rail, the first and second rails each having a longitudinally extending neutral axis and a rack, the rack extending along a pitch line that at least approximately coincides with the longitudinally extending neutral axis.~~

22. (Currently Amended) The assembly of Claim 15, wherein the track assembly ~~includes~~ further comprises:

~~first and second elongate flexible rails, the rails being spaced apart and approximately parallel to each other; and~~

a plurality of vacuum attachment devices connected to each rail and spaced at intervals therealong for releasably attaching each rail to the surface of the workpiece by vacuum, with the widths of the rails extending substantially parallel to the surface of the workpiece, the rails bending and twisting as needed to substantially follow the surface of the workpiece.

23. (Original) The assembly of Claim 22, wherein each rail is relatively stiff in bending about a first bending axis and relatively flexible in bending about a second bending axis orthogonal to the first bending axis, and wherein each rail is mounted on the workpiece such that the first bending axis is substantially normal to the workpiece surface and the second bending axis is substantially parallel to the workpiece surface.

24. (Original) The assembly of Claim 15, wherein the carriage includes a drive assembly adapted to drive the carriage along the track assembly and having a drive motor coupled to a drive gear, the drive gear operatively engaging the rack.

25. (Original) The assembly of Claim 15, wherein the rack includes a plurality of apertures and wherein the carriage includes a drive assembly adapted to drive the carriage along the track assembly and having a drive motor coupled to a drive gear, the drive gear having a plurality of teeth, at least some of the teeth operatively engaging the apertures of the rack, the apertures being adapted to match a cross-sectional profile of the teeth.

26. (Original) The assembly of Claim 15, further comprising an opposing-force support assembly operatively coupled to the carriage and adapted to be secured to the workpiece to at least partially counterbalance a manufacturing force exerted on the work-piece by the manufacturing tool.

27. (Canceled).

28. (Original) The assembly of Claim 15, wherein the manufacturing tool includes a drill and the manufacturing operation includes a drilling operation.

29. (Currently Amended) A method of performing a manufacturing operation on a workpiece, the method comprising:

attaching a track assembly to the workpiece, the track assembly including at least one rail having a longitudinally-extending neutral axis and a rack extending along a pitch line that at least approximately coincides with the longitudinally-extending neutral axis, wherein the rack comprises ~~one or more~~ a plurality of tapered apertures;

moveably coupling a carriage to the track assembly, the carriage comprising an x-axis portion moveable relative to the workpiece along the rails;

slideably coupling a y-axis portion to the x-axis portion of the carriage, wherein the y-axis portion is moveable with respect to the x-axis portion along a y-axis oriented transversely to the track assembly;

moveably supporting a manufacturing tool on the ~~track assembly~~ carriage;

engaging a drive apparatus with the rack; and

driving the carriage supporting the manufacturing tool along the track assembly using the drive apparatus.

30. (Original) The method of Claim 29, wherein attaching a track assembly to the workpiece includes applying a suction force against the workpiece with the track assembly.

31. (Original) The method of Claim 29, wherein attaching a track assembly to the workpiece includes attaching a track assembly having at least one rail that includes a rack integrally-formed in the rail.

32. (Canceled).

33. (Currently Amended) The method of Claim 29, wherein attaching a track assembly to the workpiece includes attaching a track assembly having at least one rail that includes a rack, wherein the rack comprises a plurality of ~~one or more~~ wedge-shaped apertures.

34. (Currently Amended) The method of Claim 29, wherein attaching a track assembly to the workpiece includes attaching a track assembly having at least one rail that includes a rack, wherein the rack comprises a plurality of ~~one or more~~ conically-shaped apertures.

35. (Original) The method of Claim 29, wherein attaching a track assembly to the workpiece includes attaching a track assembly having at least one rail, wherein the rail comprises a substantially flat member having a width substantially greater than a thickness of the

substantially flat member, the substantially flat member being substantially stiffer in bending about a stiff axis that extends in a first direction aligned along the thickness of the substantially flat member, and being substantially more flexible in bending about a bending axis that extends in a second direction aligned along the width of the substantially flat member.

36. (Currently Amended) The method of Claim 29, wherein moveably supporting a manufacturing tool on the carriage track assembly includes ~~moveably coupling a carriage to the track assembly, the carriage including~~ providing a tool support adapted to receive and support a manufacturing tool on the carriage.

37. (Currently Amended) The method of Claim 29, wherein ~~moveably supporting a manufacturing tool on the track assembly includes moveably coupling a carriage to the track assembly, the carriage including~~ engaging a drive apparatus with the rack includes providing the carriage with a drive assembly adapted to drive the carriage along the track assembly and having a drive motor coupled to a drive gear, the drive gear operatively engaging the rack.

38. (Original) The method of Claim 29, wherein engaging a drive apparatus with the rack includes engaging at least one tooth with at least one aperture, the aperture being adapted to match a cross-sectional profile of the tooth.

39. (Original) The method of Claim 29, further comprising performing a manufacturing operation on the workpiece using the manufacturing tool.

40. (Original) The method of Claim 39, wherein performing a manufacturing operation includes performing a drilling operation.

41. (Original) The method of Claim 29, further comprising applying an opposing force against the workpiece using an opposing-force support assembly, the opposing force being in a

direction substantially opposing a manufacturing force exerted against the workpiece during a manufacturing operation.

42. (Original) The method of Claim 41, further comprising simultaneously with applying an opposing force, performing a manufacturing operation on the workpiece using the manufacturing tool.

43. (Currently Amended) An assembly for performing a manufacturing operation on a workpiece, the assembly comprising:

a track assembly attachable to the workpiece and including a plurality of at least one rails, the rails being spaced apart and oriented approximately parallel, each the rail having a longitudinally-extending neutral axis and a rack extending along a pitch line that at least approximately coincides with the longitudinally-extending neutral axis, wherein the rack includes a plurality of apertures; and
a carriage comprising an x-axis portion moveably coupled to the track assembly and moveable relative to the workpiece along the rails, and a y-axis portion slideably coupled to the x-axis portion and moveable with respect to the x-axis portion along a y-axis oriented transversely to the track assembly ~~a carriage moveably coupled to the track assembly and moveable relative to the workpiece along the track assembly;~~

the carriage including a manufacturing tool that performs the manufacturing operation on the workpiece, and a drive assembly having at least one rotatable drive gear that includes a plurality of outwardly-projecting teeth configured to fittingly engage the plurality of apertures as the drive gear is rotated, the drive gear moving the carriage along the track assembly as the drive gear is rotated.

44. (Currently Amended) The assembly of Claim 43, wherein the plurality of apertures includes a plurality of one or more tapered apertures.

45. (Currently Amended) The assembly of Claim 43, wherein the plurality of apertures includes a plurality of one or more apertures configured to match a cross-sectional profile of the teeth.

46. (Currently Amended) A method of performing a manufacturing operation on a workpiece, the method comprising:

attaching a track assembly to the workpiece, the track assembly including a plurality of at least one rails, the rails being spaced apart and oriented approximately parallel, each rail having a longitudinally-extending neutral axis and at least one rail having a rack extending along a pitch line that at least approximately coincides with its the longitudinally-extending neutral axis, wherein the rack includes a plurality apertures;

moveably coupling a carriage to the track assembly, the carriage comprising an x-axis portion moveable relative to the workpiece along the rails;
slideably coupling a y-axis portion to the x-axis portion of the carriage, wherein the y-axis portion is moveable with respect to the x-axis portion along a y-axis oriented transversely to the track assembly;

moveably supporting a manufacturing tool on the carriage track assembly;

engaging a drive assembly with the rack, the drive assembly having at least one rotatable drive gear that includes a plurality of outwardly-projecting teeth configured to fittingly engage the plurality of apertures as the drive gear is rotated; and

driving the carriage manufacturing tool along the track assembly including rotating the drive gear.

47. (Currently Amended) The method of Claim 46, wherein attaching a track assembly to the workpiece includes attaching a track assembly to the workpiece, the track assembly including a plurality of at least one rails, the rails being spaced apart and oriented approximately parallel, each rail having a longitudinally-extending neutral axis and at least one rail has a rack extending along a pitch line that at least approximately coincides with its ~~the~~ longitudinally-extending neutral axis, wherein the rack includes a plurality of tapered apertures.

48. (Currently Amended) The method of Claim 46, wherein attaching a track assembly to the workpiece includes attaching a track assembly to the workpiece, the track assembly including a plurality of at least one rails, the rails being spaced apart and oriented approximately parallel, each rail having a longitudinally-extending neutral axis and at least one rail has a rack extending along a pitch line that at least approximately coincides with its ~~the~~ longitudinally-extending neutral axis, wherein the rack includes a plurality of one or more apertures configured to match a cross-sectional profile of the teeth.